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Destruction of australites by aborigines in part of the Eastern Goldfields, Western Australia

by W. H. Cleverly and Evelyn I. Cleverly
W.A. School of Mines and 79 Ward Street, Kalgoorlie, W.A. 6430

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Abstract

Searches at 238 natural sources of drinkable water in part of the Eastern Goldfields of Western Australia have resulted in the discovery of australites at 13% of the sites, usually as flakes and in very small numbers. Already existing collections of australites from the study area totalling 26 609 specimens have been examined and the abundance of flakes determined. From these two studies and from a consideration of the forms of the flaked australites, it is estimated that less than 1% of australites have been used destructively by Aborigines. This level of destruction can have had no significant effect upon the australite distribution pattern.

Introduction.

It is conceivable that the use of australites (Australian tektites) by Aborigines (Baker 1957, Johnson 1963-4, Edwards 1966, Akerman 1975) could have affected significantly their numbers and distribution pattern, thereby rendering unreliable features of the distribution which, it is hoped, provide pointers to australite origins (Cleverly 1976). This study concerns the degree of destructive use within an area of about 70 000 km^2, or less than 2% of the visible strewnfield, avoiding the question of removal of australites from their sites of find for non-destructive use as charms or ritual objects or for trade. The study area (Fig. 1) includes parts of the Menzies, Edjudina, Kalgoorlie, Kurnalpi, Boorabbin and Widgiemooltha 1:250 000 map sheets, SH51-5, -6, -9, -10, -13 and -14 in the R102 and National Topographic map series. Geological maps with the same names on the same scale issued by the Bureau of Mineral Resources, Geology and Geophysics and by the Geological Survey of Western Australia provide some synonymous and additional place names. Where necessary, as for example with duplicated names, localities are referred to by map number and metric co-ordinates in the following style:— SH51-9, UF4687.

The extent of australite destruction by Aborigines has been investigated by searches for flaked australites and by the examination of already existing collections for their presence.

Results

1. *Rock and australite flakes at natural sources of water*

Rock flakes foreign to the site are often found near gnamma holes and other natural sources of drinkable water in the Eastern Goldfields. The flakes are usually varieties of opal or cryptocrystalline silica such as common opal, moss opal, chalcedony or jasper which develop especially abundantly in this semi-arid climate as weathering products of ultrabasic rocks. Other materials such as cherts, fine grained quartzites, aphanitic igneous rocks and the silicified cappings of sediments may also be represented. All of these are tough and their more or less perfect conchoidal fracture makes them generally suitable for working. The combination of suitability of materials, occurrence distant from their outcrops and close association with sources of water is strong circumstantial evidence that the materials were transported to the sites by Aborigines and are the debris or the unused fraction from the making of artifacts. The existence of aborigines in an extensive semi-arid region must have depended greatly upon their ability to find and use wisely the natural sources of water. It appeared therefore that natural sources of water, even if not recognized occupation sites, would at least have been visited from time to time and would be likely places at which to seek evidence of the use of australites. The results of searching water sources for introduced rock matter and australites are presented in Table 1 for the 32 sites where australite specimens were found. A concise statement of the same items of information for all 238 sites can be supplied on request. These sites are not an exhaustive sample of the natural water sources of the area but they do include well over 90% of the named granite rocks, soaks, gnamma holes, rock holes, pools and swamps.

Rock flakes were not usually found immediately alongside the water but some tens of metres distant on a sandy rather than rocky slope, however slight, overlooking the water whenever such a slope was available. The occurrences of introduced rock flakes have been roughly quantified in four categories of increasing abundance according to the quantity found per person in ten minutes, the search period commencing when the area of concentration, if any, had been located. The categories are:—

rare	one to three flakes
uncommon	more than three flakes, less than a handful
common	one to two handfuls
abundant	more than two handfuls

Around some water points there was no evident favoured area, but an occasional flake, core stone, grinder or anvil stone (usually broken) was found thinly scattered over an area of up to a hectare or so. In such cases, the abundance was usually "rare" though the total amount of material might be considerable.

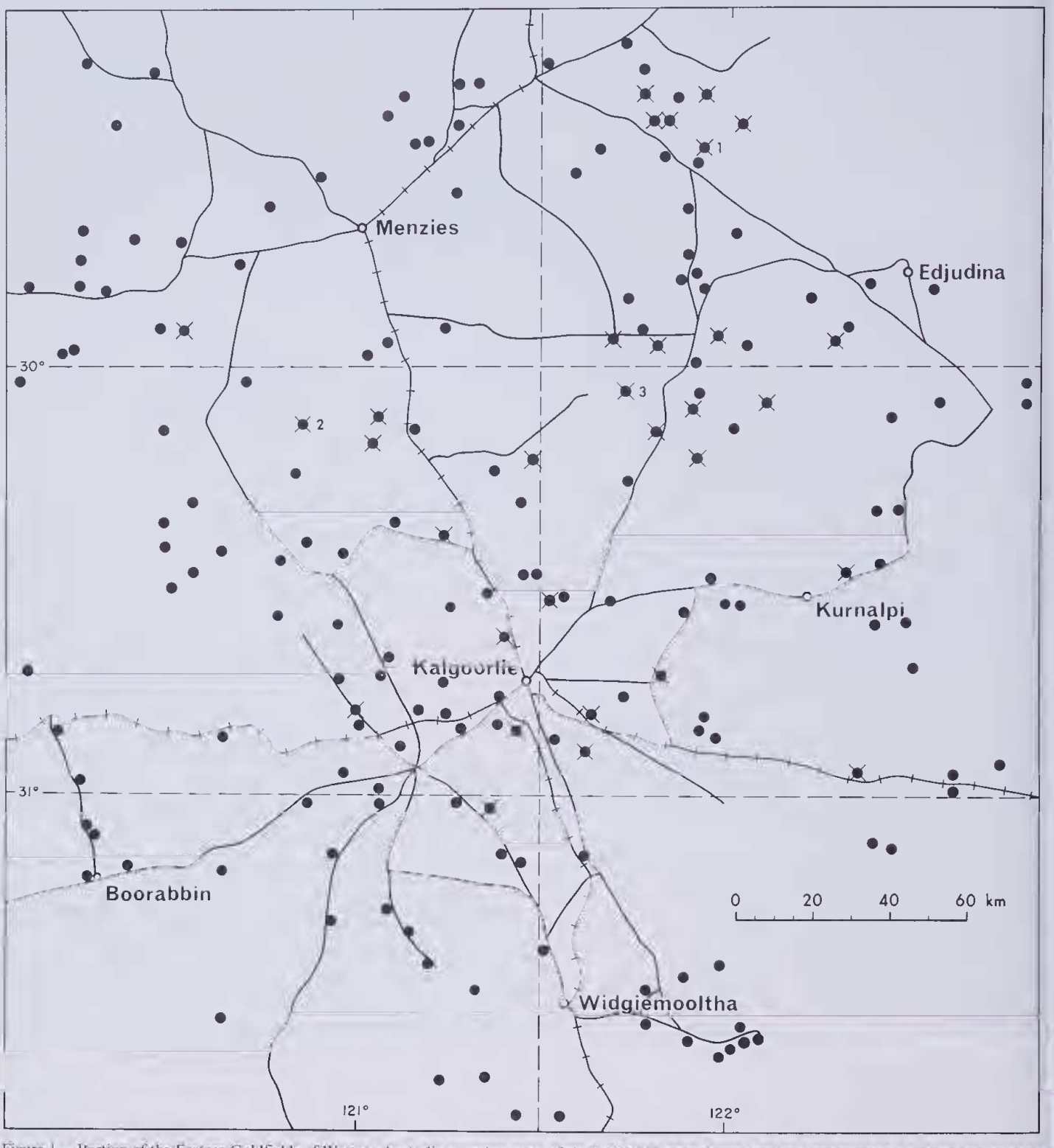

Figure 1.—Portion of the Eastern Goldfields of Western Australia covering parts of six 1: 250 000 map sheets (broken line boundaries): the name town of each sheet is shown. Filled circles indicate water sources examined except that for those less than 4 km apart, only the more important is shown. Crossed circles are sites where australite specimens were found. Sites of australite abundance are numbered thus:— 1. McAuliffe Well. 2. Wangine Soak. 3. Carr Boyd Rocks.

Introduced rock flakes in widely differing abundance and degree of dispersal were found at 85% of the searched sites. Of the remainder, two-thirds are within the extensive area of granite occupying the south-west quadrant of the study area, where introduced flakes are rare or absent except at marginal sites or where related to the large inlier of stratiform rocks centred on Ryans Find. The granite is so extensive that introduced materials would need to be carried at least 50 km to a site such as Thursday Rock. The absence of introduced rock flakes does not mean that the site was not visited by Aborigines, who may have used materials immediately at hand. For example, at a granite "rock" (island hill), they may have used quartz, aphanitic apophyses of the granite or deeply weathered and subsequently silicified granite crusts (a widespread material with some resemblance to quartzite in breaking through the enclosed quartz grains and siliceous matrix): there are

conchoidally fractured pieces of such materials, especially the siliceous crusts, at some sites. The writers claim no ability to recognize artifacts but only to recognize rocks foreign to their surroundings. Thus a water source such as Gnarlbine Rock, a granite with excellent water seepages and a native well, was certainly used, though only two introduced rock flakes were found in two searches. Likewise, introduced rock flakes were not found at the Taurus gnamma hole (Table 1) which is within ultramafic rocks, but the superabundance of locally derived opal and chalcedony flakes might well include artifacts. Similarly again for a plunge pool at Smithfield where the surroundings are silicified sediments admirably suitable for use, and for a gnamma hole south of Jaurdi, where there is abundant outcropping jasper bar only 100 m away: there would be no need to introduce raw materials from a distance to such sites.

Table 1

Number of australites and abundance of rock flakes at natural water sources in the Eastern Goldfields

Water source, map sheet, co-ordinates	Australites		[3]RF	Registered number of australites; notes
	[1]UF	[2]F		
Ularring Rock, an upstanding granite with extensive seepage areas, soaks (including rock-lined Government soak), gnamma holes and shallow holes. SH51-5, TG6387.	0	2	U	SM12 096. Flakes thinly widespread.
Claypan. Shorty Dam adjoins. SH51-6, UH9751.	0	1	U	SM11 769. Flakes especially round south-west margin.
Rock holes in Davis Creek. SH51-6, VH0843.	0	7	U	SM11 776, SM12 005. Flakes on low sandy rise overlooking creek.
Prospector Pool in Nine Mile Creek. SH51-6, UH8151.	0	1	U	SM12 087. Flakes mainly on north-west side.
Four Mile Pool. SH51-6, UH8344.	3	5	U	SM12 088. Flakes on west side, rare elsewhere.
Top Pool in tributary of Yerilla Creek. SH51-6, UH8744.	0	1	U	SM12 086. Flakes on bare areas south side of creek.
McAuliffe Well. Rock-lined soak at foot of granite rock with also shallow holes on the rock. Rock arrangement nearby. SH51-6, UH9637.	10	200	A	SM11 704. Flakes plentiful on rock and at northern foot below the soak towards the rock arrangement. Also 4 australites and 115 flakes in Tillotson colls.
Gnamma hole in low outcrops of granite. SH51-6, UG7388.	0	1	U	SM12 052.
Gnamma hole and a few shallow holes in low granite outcrops at east end of Cockatoo Rocks. SH51-6, UG8685.	0	1	R	SM12 095.
Very small pools in creek west of Princess Bore. SH51-6, VG0189.	0	1	C	SM12 106. Flakes common in small patches both sides of creek.
Walbrook Swamp Dam. A large dam occupying most of a hollow, original nature now indeterminate. SH51-6, VG3189.	0	1	U	SM12 108. Flakes along northern shoreline.
Wangine Soak. Seepage with soaks and deeper wells at foot of breakaways. Also small plunge pools and other rock holes in the gullies incised in the breakaway edge. SH51-9, TG9362.	6	204	A	SM11 755. Rock and australite flakes occur as lag deposit on low sand dunes overlooking the soak area from the south-east.
Plunge pools (3) and smaller rock holes down the gully from the breakaway edge about 250 m west-south-west from Wangine Soak. Also several shallow holes on the plateau surface. SH51-9, TG9362.	0	2	U	SM10 933. Rock flakes uncommon on the plateau in general vicinity and up to 200 m north-westerly along the former telegraph line to Davyhurst.
Small granite rock in elbow of creek and wash therefrom northward towards Lake Owen. SH51-9, UG1160.	1	4	A	SM12 029.
Granite forming middle north shore of Lake Owen. SH51-9, UG1367.	0	2	C	SM12 027.
Cane grass swamp about half kilometre long at narrow south-western end of very large lignum swamp in crab hole country and contiguous with it. Latter not searched. SH51-9, UG5556.	2	0	C	SM12 105. Flakes common on north-west margin. Rare to uncommon on south side.
Gnamma hole in duricrust alongside Broad Arrow to Ora Banda road. SH51-9, UG3133.	1	0	U	SM9532.

Table 1—*continued.*

Water source, map sheet, co-ordinates	Australites		[3]RF	Registered number of australites; notes
	[1]UF	[2]F		
Two small swamps with very sparse cane grass. SH51-9, UG4809.	5	0	R	SM8781, SM11 208. So-called "Little Gidgi".
Granite rock with several gnamma holes, some shallow holes, wall system and dam (Eight Mile Rock Dam). SH51-9, UF0991.	0	1	U	SM12 099. Flakes on sand at east side.
Cane grass swamp. SH51-9, UF5187.	0	1	U	SM12 097. Flakes on gentle sandy slope at east end.
Carr Boyd Rocks, an extensive granite with marginal seepages, shallow holes. SH51-10, UG7776.	1	23	A	SM12 051. Flakes especially near south end but also thinly over more than 1 km northerly.
Cane Grass Water Hole, a claypan. SH51-10, UG9570.	0	6	A	SM12 100. Flakes abundant round most of shoreline and across the floor.
Wangalli Rock, a low granite with soak and several gnamma holes. SH51-10, VG1471.	0	1	U	SM11 777.
Lake Emu, an extensive lignum swamp with also reeds, tea tree, cane grass in vicinity of the dam within the lake near its south end. SH51-10, UG8764.	0	2	C	SM12 089. Flakes along more than 1 km of the south-east margin overlooking the dam in deepest part of the lake.
Binti Binti Rocks. Seepages at foot of breakaways. SH51-10, UG9757.	0	1	U	SM11 778. Stone arrangement on the plateau surface. Rock flakes in vicinity of seepages.
Yowie Rock Hole, a gnamma hole in duricrust over granite near its low broken edge. SH51-10, VG3729.	0	1	C	SM12 098. Flakes on gentle slopes above the broken edge.
Small lake 3.5 km west of Harper Lagoon. SH51-10, UG5920.	0	2	U	SM12 069. Flakes on north shore.
Gnamma hole in duricrust near Taurus mining centre within ultra-basic belt with chalcedonic and opaline crusts. SH51-10, UG8702.	0	1	—	SM12 050. Introduced rock flakes not found but superabundant flakes of chalcedonic and opaline materials present.
Gnamma hole in duricrust 2.5 km east of north of Golden Ridge. SH51-10, UF7189.	0	1	U	SM9134. On the old Kurnalpi coach road.
Swamp with sparse cane grass and marginal tea tree. SH51-10, UF6879.	1	0	C	SM12 093. Flakes especially at south-west corner and western shoreline.
Cowarna Rocks. Granite with two gnamma holes (larger formerly covered), marginal well, some shallow holes. SH51-10, VF4077.	1	5	C	SM12 104. Rock flakes widespread, abundant in patches, especially down slope from gnamma holes.
Karramindie Soak. Marginal to low granite outcrops shown on earlier maps as Fourteen Mile Rocks. Modern maps show Fourteen Mile Rocks 2 km to the south. SH51-13, UF4466.	0	2	C	SM9020, SM11 765. Rather contaminated by bottle glass.

[1]Unflaked australites, either whole or natural fragments.

[2]Australite flakes and flaked cores.

[3]Abundance of introduced rock flakes: A – abundant, C – common, U – uncommon, R – rare.

Certain searched sites have been omitted from the lists and are not therefore included in the statistics. The Bullock Holes (SH51-10, UG8921), an important source of water to gold prospectors, and the "Waterhole" near Feysville (SH51-10, UF6375) are representative of those omitted because they were probably not significant water sources until deepening or other improvements had been carried out by the white man, whose artifacts (but not rock flakes) are found nearby. Further features which were certinly sources of water to Aborigines, even abundant sources, have sometimes been omitted because they were found to be so modified by quarrying (*e.g.* Cardunia Rocks), extensively contaminated by bottle glass (*e.g.* Wallaroo Rocks) or generally contaminated that their assessment is difficult and the result unreliable. However, it has been possible to include a few features such as the gnamma hole on the Mungari granite (since destroyed by quarrying), the gnamma hole on the Ora Banda road (a regular tourist bus stop) and the contaminated Karramindie Soak because sufficient observations had been made on them as early as 30 years ago.

At only 32 (13%) of the 238 sites were australites also found, mostly as flakes and in very small numbers (Table 1). Even where plentiful, as at Wangine soak, they form an insignificant fraction of the numbers and mass of the rock flakes. At no locality were they found without rock flakes, at least of local derivation if not introduced.

They were not found, except marginally, in the extensive area of granite and sand plain in the south-west quadrant and at sites within the Widgiemooltha map sheet. Australite flakes were abundant only at Wangine Soak and McAuliffe Well, localities previously known (Cleverly 1976: 221): Carr Boyd Rocks is in a lesser category. Australite specimens recovered during the present work have been registered in the collection of the Geology Department, W.A. School of Mines (SM).

2. Flaked australites already present in collections

The upper limit of destruction of australites by Aborigines may be estimated from representative located samples in collections if it is assumed that all flaked specimens are artifacts except those with brilliant vitreous lustre which are the likely results of "testing" (Baker 1957: 14) or some other recent cause of fracture.

The Tillotson collections, which contain 9 946 specimens from the study area representing 50 carefully searched localities from near Widgiemooltha in the south to Lake Raeside in the north, are the only acceptable sample available for the area as a whole. The flake abundance and maximum possible artifact abundance is:—

277/9 946 or 2.8%

Samples available for rather large areas gave the following results:—

Hampton Hill Station.....	241/21 927	or 1.1%
Edjudina Station.....	67/1 874	or 3.6%

Estimates for samples representing smaller areas are as follows:—

Mount Remarkable Station..	10/320	3.1%
Boyce Creek, Yerilla Station	3/143	2.1%
Run-ins to Black Flag Lake...	2/177	1.1%
Seven Mile Hill.....	1/299	0.3%
Salt lake on Ora Banda pipe track.....	0/300	—
Kambalda and adjoining Lake Lefroy.....	0/195	—

For the Mount Remarkable sample above, 8 of the 10 flakes were found around water sources. In wet seasons, Boyce Creek contains three large fresh-water pools. The Seven Mile Hill area includes the Afghan Rocks group of gnamma holes. No australite flakes were found in the two areas of salt lakes, which suggests that those from other areas are indeed the work of Aborigines.

Note on flaked australites

Flaked australite specimens seen at water sources are similar to those already present in collections. It is unusual to find an australite with a single flake scar: the type has been illustrated by an example from outside the study area (Fig. 2B). Flake scars on opposed sides of an elongated form resulting in a chisel-like shape are also rare (Fig. 2C) but are evidently widespread. There is a specimen of this type in the Finke, N. T. collection (SAM) and one from South Australia has been illustrated by Edwards (1966 Pl. 2 G,H). On the wider australites, two or more scars may be present on one or both sides (Fig. 2 D-J).

Flakes are by far the most common form with some flaked cores. About 10% are "cap pieces", one surface being the curved and weathered outer surface of the australite, the other the conchoidal fracture scar of detachment (Fig. 2 L). A further 60% show at least some small area of weathered outer australite surface. This often takes the form of a narrow strip between two sub-parallel fracture sufaces (see upper end in Fig. 2 N), indicating that at least two flakes were removed from the australite. The remaining 30% have no remnant of outer surface. Some of the smaller specimens of this type show the scars of considerable work (Fig. 2 O, P, Q, S).

Consideration of the foregoing leads to a conclusion pertinent to this investigation. The two commonest groups constituting nearly 90% of specimens show that at least two and often several flakes had to be removed to account for their shapes. Thus any one flake is not likely to represent a distinct individual australite, though it could be true for occasional "cap pieces". Several flakes could represent the work or even part of the work done on a single australite.

Discussion

Searches of 238 water sources resulted in the discovery of 511 australite specimens of which 31 are whole or naturally fractured and 480 are flakes or flaked cores. As distinct from the rock flakes, which are by definition imports to the sites, the australites might either have been found nearby or brought in. The high proportion (more than 15:1) of flaked to unflaked specimens (see for example Fig. 2A), their occurrence at water sources and invariable association with rock flakes suggest that most, if not all flaked australites were shaped by aborigines. Experience in other parts of the australite-strewn field supports this view. Edwards (1966) classified 443 specimens from Aboriginal camp-sites in South Australia into 130 complete specimens (29%), 161 fractured specimens without purposive trimming (36%), 56 trimmed pieces (13%) and 96 implements (22%). Concerning the group of untrimmed fractured specimens, Edwards said "Most of these are flakes with a well developed bulb of percussion. Since they were collected on former camp-sites they probably were produced by human agency". Thus three groups totalling 71% could be attributed to Aboriginal workmanship and the remaining 29% complete specimens were "believed to have been used in Aboriginal 'magic' ". Akerman (1975) classified 385 pieces from around a gnamma hole near Rawlinna into 295 struck flakes, 60 utilised flakes and 30 implements, thus regarding all specimens as artifacts. Akerman (1975) also examined 137 specimens (SM10 943-5) from Spider Bore and the adjoining Mesquite Swamp on Earaheedy Station, finding 72 struck flakes, 5 used flakes, 6 flaked cores and 34 implements, a total of 85% of specimens being thus regarded as artifacts.

The 480 flaked specimens found during the present work include 427 from three sites where there were evidently special reasons for their popularity. A localized tribal custom seems unlikely because a defined tribal boundary for which there is good evidence (Tindale 1974: 143, 252 and map) separates Wangine Soak and Carr Boyd Rocks south of the line in Maduwongga country from McAuliffe Well, just north of the line in Ngurlu country. The ready availability of large australites may have encouraged their use at McAuliffe Well. The 167 australites from the general vicinity available in collections include 7 in the high weight range 20.8-42.5 g. The average weight of complete specimens is 6.23 g and of all specimens 4.72 g, more than twice the averages of 2.99 g and 1.96 g respectively for the 26 609 Eastern Goldfields specimens examined.

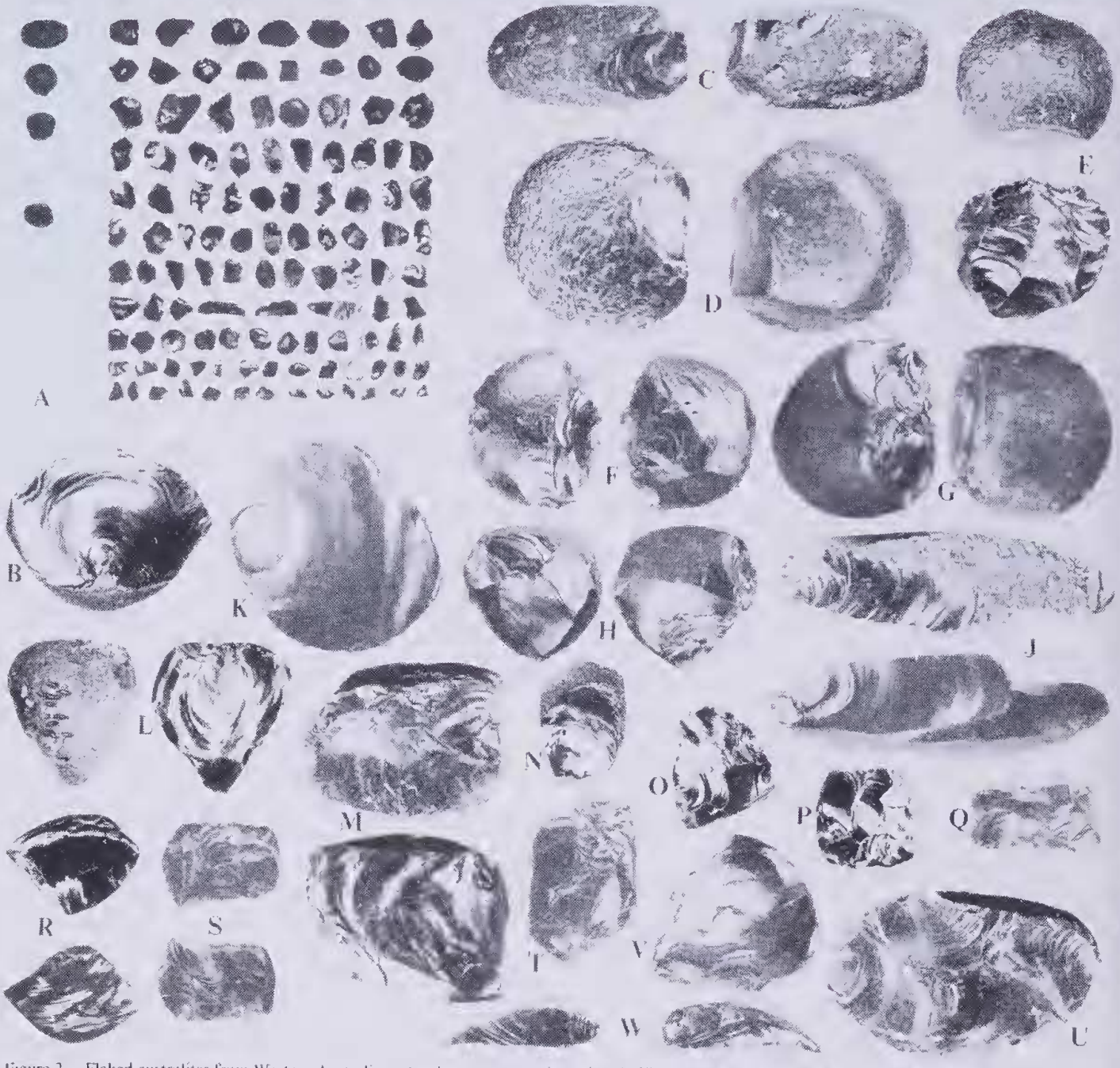

Figure 2.—Flaked australites from Western Australia, natural size except in item A. A. Three essentially complete australites at upper left, largest 21 mm long, one natural fragment and 111 flakes or flaked cores, the product of 10 person-hours collecting at McAuliffe Well, Yerilla Station, SM11 704 (part). B. Australite with single flake scar, Spider Bore, Earaheedy Station, SM10 944. C. Two views of an elongated australite flaked at one end, Edjudina Station, J. L. C. Jones coll. D. Two views of flaked australite, Lake Emu, Gindalbie Station, SM12 089. E. Two views of flaked australite McAuliffe Well, SM11 704. F. Two views of flaked australite, Taurus area, Tillotson colls. G. Two views of flaked australite, Eastern Goldfields, SM12 041. H. Two views of flaked australite, Hampton Hill Station, SM9 066. J. Two views of flaked australite, Edjudina Station, J. L. C. Jones coll. K. Cap piece, inner surface, Davis Creek, Mount Remarkable Station, SM11 776. L. Cap piece, dull weathered outer surface and bright inner fracture surface, Carr Boyd Rocks, SM12 051. M. Two views of flake, Kunanalling, Tillotson colls. N. Flake, Cowarna Rocks, Avoca Downs Station, SM12 105. O. Worked flake, Hampton Hill Station, J. L. C. Jones coll. P. Worked flake, McAuliffe Well, SM11 704. Q. Flaked australite, Carr Boyd Rocks, SM12 051. R. Two views of flake McAuliffe Well, SM11 704. S. Two views of chisellike worked flake, edge to left, McAuliffe Well, SM11 704. T. Flake, Prospector Pool, Yerilla Station, SM12 087. U. Worked flake, Hampton Hill Station, Mr & Mrs B. C. Jones coll. V. Flaked australite, Four Mile Pool, Yerilla Station SM12 088. W. Two views of pointed fragment, McAuliffe Well, SM11 704.

As pointed out by Edwards (1966), there are two principal drawbacks to the use of australites—their small size and the inferior properties of the glass compared with cryptocrystalline forms of silica. The first of those disadvantages may not have applied with the usual force at McAuliffe Well. Setting aside the flakes from the three sites of abundant usage, the remaining 53 were found in small numbers at 25 different sites.

There are at least two possible reasons why australites were not found at water sources in the extensive area of granite and sand plain in the south-west quadrant of the study area. The simplest is that australites did not fall there; the shower is generally admitted to have been very "patchy" and there do not appear to be any australites from the area in collections. However, it would be a considerable coincidence if a distribution feature of the

shower should coincide, even approximately, with a geological boundary. It is therefore more likely that australites fell in the area and have been buried in the extensive eluvium derived from the granite or in the drifting sands. A perusal of the School of Mines records shows that several australites from other parts of the sand plain were indeed found in post-holes, pipe trenches or borrow pits. Australites have been found marginally, for example at Karramindie Soak (Table 1).

There are australites in collections from various places within the Widgiemooltha sheet but there are few evident water sources. The failure to recover flaked australites from within that part of the study area might therefore be related to inadequacy of the sample.

The primary concern in this study is with destructive usage but brief comment is made here upon the 31 complete and naturally fractured australites (those having fracture surfaces as weathered as the primary and secondary surfaces). They constitute 6% of recovered specimens, about one-fifth of their abundance amongst a comparable number of specimens from South Australian camp-sites (Edwards 1966). Only 6 of the 31 weigh more than 4 g, have a maximum dimension 20-25 mm and could probably have been utilized for the production of small implements. That they were not so used suggests the possibility of retention for some non-destructive role. The remaining specimens average 1.85 g and have correspondingly smaller dimensions. Some of them, especially those found in situations such as fresh water claypans, might well have been seen by Aborigines and ignored or discarded as too small, narrow or mis-shapen for use. No evidence was recognized of any specimen having been collected for ritual or "magic" unless it is the observation that the 10 unflaked specimens from McAuliffe Well include a rare "square-ended" aberrant form (Cleverly 1982), a naturally fractured specimen of the same type and a rather large and well preserved teardrop. It might be speculated that because of their unusual shapes these specimens were spared for some non-destructive—possibly ritual—purpose: there is a stone arrangement at the site.

The first section of this paper concerning australite search may now be summed up. The forms of the specimens as discussed in the preceding section of this paper suggest that the 480 flaked specimens could have been derived from only one or two hundred australites, an insignificant number from an area which has yielded many thousands to dealers and lapidaries and more than 33 000 to known collections. It is a very small yield when seen as the result of searching 238 likely places.

Consider next the already existing collections. Flaked australites comprise 0-3.6% of various localized samples, not all of which are mutually exclusive. The mean flake abundance is given by:—

466/26 609 or 1.75%

This is the upper limit for abundance of australite artifacts.

The only earlier attempt to assess quantitatively the destruction of australites by Aborigines is that of Baker (1957: 13) who noted "the extreme rarity (less than 0.5 per cent) of worked australite fragments amongst the large number so far recovered". Baker's statement elsewhere (1957: 8) that Aboriginal chipped flakes and implements constituted "something in the order of 0.005 per cent" of the 30 000 to 35 000 australites in collections is clearly erroneous because 30 australite artifacts constituting about 0.1% of specimens were discussed in his paper. The erroneous statement may be reconciled with the acceptable one by omitting from it the words "per cent". The 30 000-35 000 specimens should not be confused with the more than 33 000 from the study area, at least 80% of which are in private collections which were unknown and/or unavailable to Baker.

The basis of Baker's estimate differs from that used here. Strict criteria were applied for recognition as an artifact—"... one can only be reasonably sure that certain fragmented australites were worked by Aboriginal man if undisputed evidence is present of the application of marginal pressure flaking or the like" (Baker 1957: 13). It seems probable that little more than that fraction which other authors class as "implements" was accepted as artifacts. In contrast, no criteria whatever have been applied here, the upper limit of artifact abundance being thus determined. There is no available information on the number of implements compared with total flakes in collections except in the highly biased samples from occupation sites. There could be a considerable difference in the proportions because flakes found in occupation sites are likely to have been produced by human agency or at least attributed to it whilst those from elsewhere have more chance of being products of temperature changes (including grass fires), breakage by animals or vehicles, development of saw-cuts or some other weathering process. It is safe to say that Baker's "less than 0.5 per cent" needs to be increased several times, possibly to "less than 3 per cent" to be placed on the same basis as the maximum of 1.75% found here.

Conclusion

Flaked australites from part of the Eastern Goldfields average 1.75% of the australites in localized samples and could have been produced from the destruction of distinctly less than 1% of their number. The fact that collectors sometimes ignore flakes (Cleverly 1976: 220) is not applicable to the major collections used here. Samples collected from water sources do not suggest any need to increase the estimate. Even if all the flaked specimens are artifacts, the level of destruction would be too low to affect the numbers and distribution pattern as currently known. This estimate for part of the Eastern Goldfields is of the same order of size as the estimate of Baker (1957) for the australite-strewn field as a whole. The low level of usage suggests a possibility not initially visualized nor investigated that australites passing through the hands of dealers and lapidaries with virtually no written record, and the considerable number of poorly documented and therefore almost valueless specimens in collections (Cleverly 1976: 222) might well represent a greater loss of information on the australite-strewnfield than is attributable to destruction by Aborgines.

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Mr M. K. Quartermaine took part in some field work and also processed our photographs used in Figure 2. Ms J. M. Wearne drafted Figure 1.

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